Central venous port devices made of two different polymeric materials, thermoplastic polyurethane (TPU) and silicone rubber (SiR), were compared due their material properties” Braun et al (2016).

Abstract:

Central venous port devices made of two different polymeric materials, thermoplastic polyurethane (TPU) and silicone rubber (SiR), were compared due their material properties. Both naïve catheters as well as catheters after removal from patients were investigated. In lab experiments the influence of various chemo-therapeutic solutions on material properties was investigated, whereas the samples after removal were compared according to the implanted time in patient. The macroscopic, mechanical performance was assessed with dynamic, specially adapted tests for elasticity. The degradation status of the materials was determined with common tools of polymer characterisation, such as infrared spectroscopy, molecular weight measurements and various methods of thermal analysis.

The surface morphology was analysed using scanning electron microscopy. A correlation between material properties and clinical performance was proposed. The surface morphology and chemical composition of the polyurethane catheter materials can potentially result in increased susceptibility of the catheter to bloodstream infections and thrombotic complications. The higher mechanic failure, especially with increasing implantation time of the silicone catheters is related to the lower mechanical performance compared to the polyurethane material as well as loss of barium sulphate filler particles near the surface of the catheter. This results in preformed microscopic notches, which act as predetermined sites of fracture.

Reference:


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